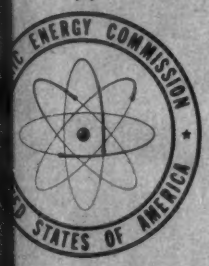
UNITED STATES ATOMIC ENERGY COMMISSION

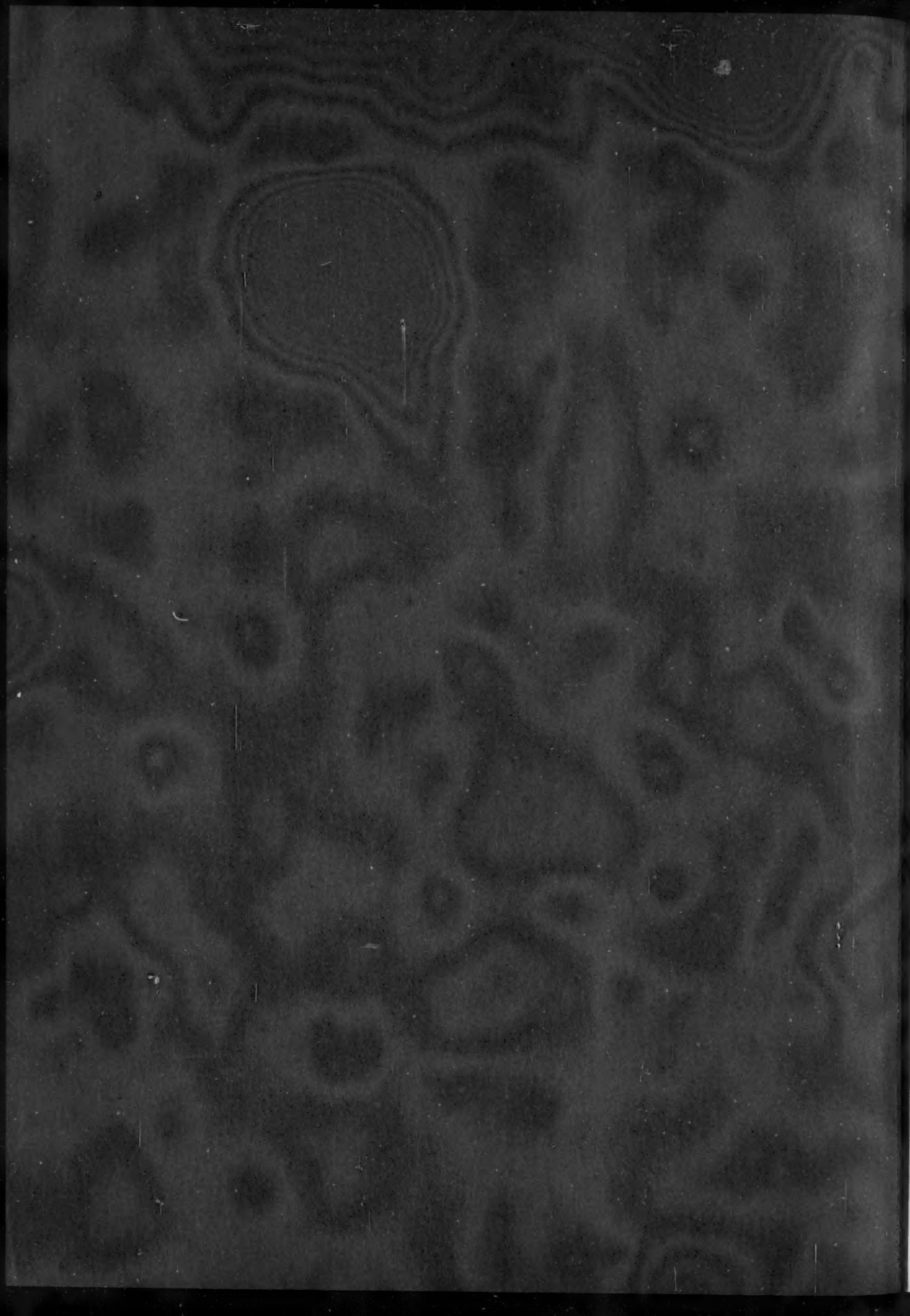
UNIVERSITY OF MICHIGAN
AUG 3 1956
ENGINEERING LIBRARY

Nuclear Science Abstracts

Volume 10 No. 13
Abstracts 3891 - 3960
July 15, 1956



Technical Information Service Extension, Oak Ridge, Tenn.



NUCLEAR SCIENCE ABSTRACTS

Volume 10 July 15, 1956 No. 13

GENERAL

RESEARCH PROGRAMS

3891 BNL-375
Brookhaven National Lab., Upton, N. Y.
QUARTERLY PROGRESS REPORT OCTOBER 1,–DECEMBER 31, 1955. 64p. Contract [AT-(30-2)-Gen-16]. $0.40(OTS).

Abstracts of papers submitted for journal publication are included. The operational efficiency of the Cosmotron continued high. Developmental work on accelerator design is reported. Services furnished to off-site users of the BNL reactor, irradiation facilities, and services are summarized. Isotope shipments made during the period are listed. Preliminary results in studies on solid-state radioinduced polymerization of styrene grafted to polyethylene and to teflon are reported. Heat-transfer and pressure-drop characteristics were determined for Hg flowing normal to a bank of staggered tubes. Calibration and minor design modifications in radiation detection and other instruments are reported. Brief summaries are presented of preliminary results from biochemical and physiological research studies in progress. Data are presented graphically from studies on B distribution among mouse brain, brain tumor, and muscle and the viability of mouse brain tumor following B^{10}–borax neutron capture irradiation. (For preceding period see BNL-367.) (C.H.)

BIOLOGY AND MEDICINE

3892 AEC-tr-2451
ENZYMATIC ACTION AND CONDITION WITHIN PLASTIDS. N. M. Sisakyan and A. N. Kobiakova. Translated by Eugenia Artschwager from Biokhimiya 13, 88-94(1948). 14p.

3893 AEC-tr-2452
TYPE OF CHANGES IN STRUCTURE AND ENZYMATIC ACTIVITY OF PLASTIDS IN THE ONTOGENETIC CYCLE OF PLANT DEVELOPMENT. N. M. Sisakyan, V. I. Biriuzova, and A. M. Kobiakova. Translated by Eugenia Artschwager from Biokhimiya 16, 449-52(1951). 10p.

3894 AEC-tr-2453
ISOLATION OF PROTEIN FROM PLASTIDS AND ITS CHARACTERIZATION. N. M. Sisakyan, E. N. Bezinger, and E. B. Kuvayeva. Translated by Eugenia Artschwager from Doklady Akad. Nauk S.S.S.R. 87, 113-16(1952). 6p.

3895 AEC-tr-2454
POLYPHENOLOXIDASE AND PEROXIDASE ACTIVITY IN ISOLATED PLASTIDS. N. M. Sisakyan and E. B. Kuvayeva. Translated by Eugenia Artschwager from Doklady Akad. Nauk S.S.S.R. 62, 121-4(1948). 5p.

3896 AEC-tr-2462
STRUCTURE OF PLASTIDS AND ACTIVITY OF ENZYMES. N. M. Sisakian, A. M. Zolkover, and V. I. Biriuzova. Translated by Eugenia Artschwager from Doklady Akad. Nauk S.S.S.R. 60, 1145-8(1948). 6p.

RADIATION EFFECTS

3897 NYO-4926
Western Reserve Univ., Cleveland. Atomic Energy Medical Research Project.
EFFECT OF X-IRRADIATION ON RAT SPLEEN ADENYLATE KINASE. Edwin M. Uyeki. Jan. 31, 1956. 13p. Contract W-31-109-Eng-78. $3.30(ph OTS); $2.40(mf OTS).

A marked increase in the activity of adenylate kinase activity in the spleens of rats was observed following exposure to sublethal doses of x ray. The activity was greatest at 3 days post-irradiation which was then followed by a gradual return to normal enzyme activity during the three week period of investigation. The results of this study indicate that the increase in adenylate kinase activity may contribute to the overall decrease in adenosine nucleotide content of spleen tissue brought about by x irradiation. (auth)

3898 UR-436
Rochester, N. Y. Univ. Atomic Energy Project.
EVALUATION OF MAGNESIUM POWDER AS A SOURCE FOR THE PRODUCTION OF LARGE AREA FLASH BURNS ON PIG SKIN. H. W. Bales, R. E. Roth, L. J. Krolak, and H. E. Pearse. Mar. 22, 1956. 16p. Contract W-7401-eng-49. $3.30(ph OTS); $2.40(mf OTS).

A heat source employing burning Mg flash powder in various charges and distances from the subject was studied for its ability to inflict reproducible large area burns on swine. Incident radiant thermal energy for each powder charge and each distance was measured with a cone calorimeter and found to be consistent for each combination. The burns produced by each of these combinations were assessed both for surface appearance and microscopic measurement of depth of damage. By both methods of grading each charge-distance combination gave uniform, reproducible burns. It was concluded that this source provides a dependable and useful tool for the laboratory study of large area flash burns. (auth)

RADIATION HAZARDS AND PROTECTION

3899 UCRL-3355
California. Univ., Berkeley. Radiation Lab.
CALIFORNIA CATTLE THYROID ACTIVITY ASSOCIATED WITH FALLOUT, 1955. Margaret R. White and Ernest L. Dobson. Mar. 28, 1956. 14p. Contract W-7405-eng-48. $0.20(OTS).

Thyroids from cattle slaughtered in the San Francisco Bay Area were collected from February until September 1955 and followed for radioactivity. A period of elevated radioactivity was noted, which lasted from the end of March until the end of July. The total maximum beta-ray dose from the elevated activity during this time was approximately 1 rep. This was a maximum, not the average, dose delivered to the thyroid tissue of the cattle studied. Evidence is presented which appears to indicate that the radioactivity was taken into the body of cattle through the food. (auth)

RADIOGRAPHY

3900 NYO-4927

Western Reserve Univ., Cleveland. Atomic Energy Medical Research Project.

THE USE OF THE HEPATOSCAN FOR THE VISUALIZATION OF LIVER ABNORMALITIES. Abbas M. Rejali, W. J. MacIntyre, and H. L. Friedell, Mar. 17, 1956. 38p. Contract W-31-109-Eng-78. $6.30(ph OTS); $3.00 (mf OTS).

In our effort to utilize the radioisotope technique to obtain graphic illustration of the liver, consideration has been given to different materials that would provide satisfactory visualization. Equipment, technique of the liver scanning, and dosage of the material used are discussed. A group of normal and abnormal hepatoscans are demonstrated in this report. (auth)

TRACER APPLICATIONS

3901 UCLA-366

California. Univ., Los Angeles. Atomic Energy Project.

THE RADIOISOTOPE RENOGRAM. (An External Test for Individual Kidney Function and Upper Urinary Tract Patency). George V. Taplin, Orsell M. Meredith, Jr., Harold Kade, and Chester C. Winter. May 2, 1956. 34p. Contract AT-04-1-Gen-12. $4.80(ph OTS); $2.70(mf OTS).

The radioactive Diodrast renogram test described in this report is an application of external gamma-ray scintillation counting techniques to estimate the vascularity, tubular cell function, and patency of the upper urinary passages in each kidney area separately. (auth)

3902 AEC-tr-2456

ACTION OF HEAVY WATER ON THE REACTION OF PHOTOREDUCTION OF CHLOROPHYLL AND THE PHOTOCHEMICAL ACTIVITY OF THE SUBSTANCE OF GREEN LEAVES. A. A. Krasnovskii and G. P. Breen. Translated by Vincent Frederick from Doklady Akad. Nauk S.S.S.R. 96, 1025-8(1954). 6p.

CHEMISTRY

3903 ISC-706

Ames Lab., Ames, Iowa.

SEMI-ANNUAL SUMMARY RESEARCH REPORT IN CHEMISTRY. FOR JULY–DECEMBER, 1955. Mar. 9, 1956. 60p. Contract W-7405-Eng-82. $0.40(OTS).

Phase studies on La–C and La–Gd alloys are reported. The vapor pressure of Tm at 850°C is $\sim 10^{-2}$ mm. Transport numbers, H_2O solubility, complex formation, and metal–metal salt solubilities in fused salts were studied. The heat capacity of anhydrous chromic chloride and of Ho from 15 to 300°K was measured. The (C–H) bond dissociation energy in the methyl group of toluene was estimated. A mass spectrometric method was developed for analyzing mixtures of CO, N_2, and H_2. Work was continued on the pyrometallurgical processing of irradiated U. Liquid immiscibility limits of U and Sm were investigated. The corrosion of Ta by liquid Bi–U alloys was studied. New analytical procedures for Sb, Co, Ni, F_2, I_2, Mg, Ti, V, H_2O, Zn, SO_4^{2-}, Hg, and organic acids are outlined. The ultraviolet absorption spectra of several β-diketones are tabulated. Procedures for the spectrochemical determination of Ta, rare earths, Zr, and O_2 are outlined also. The ether extraction of thallium chlorides is briefly discussed

Isotopic exchange in Cl^--$K(PtNH_3Cl_3)$ systems and Szilard-Chalmers separation of Co^{58m} from Co-ethylenediamine-complex targets were investigated. X-ray-diffraction analyses of iron carbonyls and tin "whiskers" are reported. (For preceding period see ISC-643.) (C.W.H.)

3904 NAA-SR-1026

North American Aviation, Inc., Downey, Calif.

GENERAL CHEMISTRY QUARTERLY PROGRESS REPORT FOR JANUARY–MARCH 1954. Eugene L. Colichman, ed. Decl. Nov. 9, 1955. 42p. Contract AT-11-1-GEN-8. $0.30(OTS).

The thermal and radiation stability of terphenyls is under investigation. Quantitative data on decomposition rates, heat transfer, fluid flow, and purification methods are being determined. Infrared and viscometric methods for the analysis of polyphenyls were developed. The dissociation pressures of ZrH_4 at high pressures and temperatures were determined. Analytical problems are discussed. (For preceding period see NAA-SR-912). (C.W.H.)

3905 AEC-tr-2455

STUDIES ON THE REACTION BETWEEN POLYNITROBENZENE COMPOUNDS AND ACTIVE METHYLENE GROUPS. II. SYNTHESIS OF PICRYL COMPOUNDS. Michiya Kimura. Translated from J. Pharm. Soc. Japan 73, 1216-18(1953). 6p.

Ethyl α(2,4,6-trinitrophenyl)-acetoacetate, m.p. 97 to 98°, (2,4,6-trinitrophenyl)-acetone, m.p. 77 to 78°, ethyl α-(2,4,6-trinitrophenyl)-benzoylacetate, m.p. 154 to 155°, and ω-(2,4,6-trinitrophenyl)-acetophenone, m.p. 134 to 135°, were prepared and their Rf values were determined by paper chromatography. Absorption spectra of their alkaline coloration were determined and it was found that the absorption maximum in the visible range was present only at 515 mμ. (auth)

ANALYTICAL PROCEDURES

3906 DP-151

Du Pont de Nemours (E. I.) & Co. Savannah River Lab., Augusta, Ga.

AN ALL-OVER SPOT TEST. Victor I. Montenyohl. Mar. 1956. 8p. Contract AT(07-2)-1. $0.10(OTS).

The techniques of detecting impurities at the surface of aluminum by electrolytic sampling and colorimetric spot testing have been extended by the development of an indicating coating that can be applied to large and irregular areas by dipping or spraying. (auth)

3907 ISC-597

Ames Lab., Ames, Iowa.

PREPARATION, PROPERTIES, AND ANALYTICAL APPLICATIONS OF SOME SUBSTITUTED ALICYCLIC VIC-DIOXIMES. Donald Thomas Hooker and Charles V. Banks. Mar. 1955. 120p. Contract W-7405-eng-82. $0.60(OTS).

Aliphatic substituted 1,2-cyclohexanedionedioximes were prepared and evaluated as possible analytical reagents for Ni and Pd determinations. Procedures are presented for gravimetric and spectrophotometric determinations of Ni and Pd using 4-methyl- and 4-isopropyl- 1,2-cyclohexanedionedioximes. (C.W.H.)

3908 KAPL-1497

Knolls Atomic Power Lab., Schenectady, N. Y.

THE DETERMINATION OF FREE ACID IN SOLUTIONS OF ALUMINUM AND THORIUM AND URANYL NITRATES. M. E. Jones, B. F. Rider, and H. C. Hendrickson. Feb. 1, 1956. 12p. Contract W-31-109-Eng-52. $0.20(OTS).

The pH of a near neutral solution of Al, $Th(NO_3)_4$, or $UO_2(NO_3)_2$ is a sensitive indication of its free acid content. Hence a measurement of pH can form the basis of a free acid determination if the solution contains only one appreciably hydrolyzed constituent and the concentration of this constituent is known. A family of curves of pH versus molarity salt is plotted. The free acid molarity of an unknown solution is determined by measuring the pH and referring to one of these curves. The method is simple and can be applied to very small samples with accuracy as good as or better than that of microtitration methods. (auth)

Refer also to abstract 3915.

LABORATORIES AND EQUIPMENT

3909 CF-54-12-78
Oak Ridge National Lab., Tenn.
RECOMBINER LOOP DETONATION. D. M. Eissenberg. Dec. 13, 1954. 9p. Contract [W-7405-eng-26].

A detonation occurred in the high pressure recombiner loop recently. Evidence of impact pressures as high as 21,000 psi bears out the supposition that a detonation of pure high pressure stoichiometric H_2 and O_2 occurred. Particles of catalyst, dislodged by flashbacks, and deposited near the pure gas stream entrance probably started the reaction. It may have been transmitted to the pure H_2-O_2 stream by a flashback through the dilute He steam-gas mixture. The detonation in no way upsets the concept of high pressure recombination. Measures are suggested to prevent recurrence. (auth)

RARE EARTHS AND RARE-EARTH COMPOUNDS

3910 AEC-tr-2390
NOTES ON STUDIES OF RARE EARTH METALS. W. Klemm and H. Bommer. Translated by Gabriele E. Wohlauer from Z. Anorg. u. allgem. Chem. 231, 160-71 (1937). 14p.

The metals of the rare earth series (with exception of Ho) were prepared by reduction of the rare earth chlorides with alkali metals. X-ray and magnetic measurements were carried out with the so-obtained mixtures of rare earth metal and alkali chloride. The observed lattice structures correspond to those which were to be expected from the regularities observed in the neighboring groups. The atomic volume curve shows pronounced maxima at Eu and Yb, flat minima at Ce, Pr and terbium. The conclusion drawn from the atomic volume curve indicates that in the individual metals of the rare earths there are not only +3 but also +2 or +4 ions respectively, confirmed by magnetic measurements. Gd is the only one of the rare earths that is ferromagnetic. Neighbor ring elements show transitions from para- to ferromagnetism. (auth)

SEPARATION PROCEDURES

3911 NAA-SR-1157
North American Aviation, Inc. Downey, Calif.
PYROCHEMICAL SEPARATIONS METHODS: I. THE DISTRIBUTION OF PLUTONIUM AND LONG-LIVED FISSION PRODUCTS BETWEEN MOLTEN IRRADIATED URANIUM FUEL AND FUSED INORGANIC FLUORIDES. Archie G. Buyers. Mar. 15, 1955. Decl. Dec. 14, 1955. 32p. Contract AT-11-1-GEN-8. $0.25(OTS).

Distribution of Pu and fission products between molten U and fused inorganic fluorides, after equilibration at 1300°C, has been measured. Salt scrubs used included: UF_4, CaF_2, LiF, mixtures of these three, and mixtures of Mg and Li fluorides. Plutonium was found in the salt phases to the extent of 75 to 95% after one equilibration. Where three successive contactings were made with fresh portions of salt all but a negligible trace of the Pu was extracted into the salt. The standard free energy change for the reaction: $\frac{1}{3}$ Pu + $\frac{1}{4}$ $UF_4 \rightleftharpoons \frac{1}{3}$ PuF_3 + $\frac{1}{4}$ U was found to be −5 kcal per equivalent instead of the −8 kcal in the literature. The distribution of the fission products was essentially as predicted from thermodynamic data assuming that UF_4 in the salt was the oxidizing agent. Cerium, rare earths, Sr, and Cs activities appeared predominantly in the salt. Ruthenium did not concentrate in the salt phase, but remained in the metal after contacting. Tellurium was removed in an erratic fashion which was not unexpected considering its volatility and instability as the fluoride. (auth)

3912 RMO-2030
International Minerals and Chemical Corp., Chicago.
URANIUM EXTRACTANTS — PREPARATION AND USE IN PHOSPHATE SYSTEM. Henry M. Heidt, Donald E. Tynan, Robert F. McCullough, and Roger Bart. Sept. 13, 1954. Decl. Oct. 27, 1955. 121p. Contract AT(49-1)-545. (IMCC-2165). $0.60(OTS).

Research accomplishments on the preparation of organic phosphate esters for the extraction of uranium from monocalcium phosphate, phosphoric acid and other acidic phosphate solutions using liquid-liquid extraction techniques are presented. Optimum combination of variables studied permit production of uranium extractants superior to those previously reported, or in use today. Pyro and/or ortho phosphoric acid esters of various alcohols were prepared by reaction of alcohol with phosphorus pentoxide in presence of kerosene as an extender. (auth)

3913 RMO-2042
International Minerals and Chemical Corp., Chicago.
URANIUM RECOVERY — WET PROCESS LIQUORS FROM PHOSPHATE ROCK. Henry M. Heidt, Donald E. Tynan, J. B. Adams, and Roger Bart. Feb. 28, 1955. Decl. Oct. 27, 1955. 125p. Contract AT(49-1)-545. (IMCC-2213). $0.60(OTS).

A summary of the laboratory research and pilot plant development programs on the extraction and recovery of U from monocalcium phosphate extract and wet process phosphoric acid is presented. (J.E.D.)

SYNTHESES

3914 UCRL-3358
California. Univ., Berkeley. Radiation Lab.
THERMAL DECOMPOSITION OF PYRUVIC ACID AND ITS ESTERS LEADING TO CO_2. H. M. Frey. Apr. 2, 1956. 5p. Contract W-7405-Eng-48. $0.10(OTS).

The thermal decomposition of butyl pyruvate, ethyl pyruvate, and pyruvic acid has been investigated in the temperature range 110 to 135°C. The reaction was carried out in the presence and absence of solvents. In all cases the gaseous decomposition product was CO_2. The decomposition was found to be catalyzed by glass powder and pyridine. A preliminary kinetic investigation of the decomposition of pyruvic acid in pyridine showed the reaction to be approximately second order. (auth)

URANIUM AND URANIUM COMPOUNDS

3915 NBL-126
New Brunswick Lab., AEC, N. J.
DETERMINATION OF URANIUM 235 BY NEUTRON ACTIVATION. J. E. Hudgens and R. C. Meyer. Apr. 1956. 21p. $0.25(OTS).

The U^{235} content of uranium in the form of pure metal or as a compound of uranium of high purity is determined by a neutron activation technique. The principles of the activation analysis method used and the processing of samples are discussed. The weight of uranium needed for the analysis ranges from a few mg for material containing a high concentration of U^{235} to 2 g for uranium material having a normal isotopic ratio. (auth)

3916 AEC-tr-2436
A CONTRIBUTION TO THE UNDERSTANDING OF COMPLEX URANYL CARBONATES. J. Arvid Hedvall. Translated by J. C. Barton from Z. anorg. u. allgem. Chem. 146, 225-9(1925). 8p.

The determination of metal ions in solution by precipitation with potassium uranyl carbonates was investigated. Properties of the Ba^{2+} and Ag^{+} precipitates are tabulated. (C.W.H.)

ENGINEERING

HEAT TRANSFER AND FLUID FLOW

3917 LA-1927
Los Alamos Scientific Lab., N. Mex.
TAYLOR INSTABILITY. Appendices to Report LA-1862. Garrett Birkhoff. Sept. 1955. 91p. Contract W-7405-eng-36. $13.80(ph OTS); $4.80(mf OTS).

A more elaborate analysis is given of various topics discussed in LA-1862, "Taylor Instability and Laminar Mixing". These topics include remarks on similarity, initial acceleration, the stability of heterogeneous fluids, steady state bubble rise, remarks on Layzer's model, calculation of interface motion, motion of polygonal interface, and globule acceleration. (B.J.H.)

3918 AEC-tr-2446
CONCERNING THE FORMATION OF BEAMS IN MOLECULAR FLOW. P. Clausing. Translated from Z. Physik. 66, 471-6(1930). 8p.

Formulas are given for the distribution of molecules which flow through a short tube into an empty vessel. (auth)

3919 AEC-tr-2447
CONCERNING THE FLOW OF GREATLY RAREFIED GASES THROUGH TUBES OF ARBITRARY LENGTH. P. Clausing. Translated from Ann. Physik. 7, 961-89(1932). 39p.

The formulas of Knudsen and Smoluchowski and Dushman for the stationary flow of a greatly rarefied gas through a cylindrical tube having an arbitrarily shaped cross section are given. The formulas for kinetic variables are discussed, and Dushman's formula is derived. The problems of the short and long round tube are discussed in some detail. The application of the flow formulas in high vacuum techniques is also discussed. (B.J.H.)

MINERALOGY, METALLURGY, AND CERAMICS

CORROSION

3920 AEC-tr-2457
STUDY ON DRY CORROSION. THE OXIDATION OF POWDERED ALUMINUM. Haldun N. Terem. Translated from Rev. fac. sci. univ. Istanbul A, 12, 299-307(1947). 5p.

It was observed that powdered Al may be oxidized at temperatures considerably higher than the melting point of the metal still in the solid state and the rate of oxidation is easily measured between 900 and 1050°C. An induction period similar to that observed during the oxidation of Be manifests itself at the beginning of the reaction and the humidity was found to exert a catalytic action on the oxidation of the metal. The activation energy of the reaction is 48,300 cal/g in dry air and 39,100 cal/g in ordinary air. The existence of a gresification phenomenon which hinders the complete oxidation and is in the case of Al already recognizable in the compact state, is observed. The gresification rate increases with temperature and humidity intensifies the phenomenon. (auth)

GEOLOGY AND MINERALOGY

3921 BM-RI-5213
Bureau of Mines.
EFFECT OF TEMPERATURE ON THE ELECTROSTATIC SEPARATION OF MINERALS. Foster Fraas. Aug. 1955. 18p.

The electrical conductivity of minerals increases with increase in temperature as a result of the thermal activation of the electrons. Some oxidizable minerals have a change in the stoichiometric proportions after heating in air, and the conductivity does not return to the original value after cooling. Similar changes occur in reducing atmospheres. Other minerals, such as carbonates and hydrates, are completely decomposed. Electrical resistivity measurements on single particles when compared to standard separation measurements show that minerals having resistivities above 10^{13} ohms respond as nonconductors. Those below 10^{11} respond as good conductors. Application of these properties to the separation of mineral mixtures is described. With the tabulated separation data of a large number of minerals, the electrostatic separation of mineral mixtures may be predicted. This is illustrated in the separation of diopside from grossularite at 500°C., a mixture that cannot be separated at lower temperatures. By heating to temperatures higher than the upper limit of the tabulated separation data, irreversible changes frequently occur, and the mineral when cooled to temperatures near atmospheric will respond in a different manner. Adaptation of irreversible changes to electrostatic separation is illustrated in the separation of epidote and hornblende from monazite, staurolite from zircon, rutile from zircon, and monazite from rhodolite. (auth)

3922 NYO-7410
Pennsylvania State Univ., University Park. Mineral Industries Experiment Station.
AN INVESTIGATION OF THE MINERALOGY, PETROGRAPHY, AND PALEOBOTANY OF URANIUM-BEARING SHALES AND LIGNITES. SCOPE A—SHALES. Quarterly

Progress Report for period of October 1, 1955 to December 31, 1955. Dec. 31, 1955. 11p. Project E-32. Contract AT(30-1)-1202. $3.30(ph OTS); $2.40(mf OTS).

3923 NYO-7412

Pennsylvania State Univ., University Park. Mineral Industries Experiment Station.

A MINERALOGICAL, PETROGRAPHIC AND PALEOBOTANICAL INVESTIGATION OF URANIFEROUS LIGNITES. SCOPE B — LIGNITES. Quarterly Progress Report [for] the period April 1, 1955 to June 30, 1955. G. O. W. Kremp and E. S. Erickson, Jr. 22p. Project E-32. Contract AT(30-1)-1202. $4.80(ph OTS); $2.70(mf OTS).

Four lignitic samples from Dunn County, North Dakota were subjected to palynological investigation. The Alamo Bluff horizon of the Golden Valley formation proved to be barren at this particular site, while spores and pollen were obtained from the other three samples. The genera identified are listed for each location and they are compared with the German work to gain some idication as to their distribution in geologic time. (auth)

METALS AND METALLURGY

3924 AECD-3722

Oak Ridge National Lab., Tenn.

DEEP HOLE DRILLING OF HOT-PRESSED BERYLLIUM METAL. J. E. Cunningham. Apr. 20, 1950. Decl. Nov. 14, 1955. 3p. Contract W-7405-eng-26. (CF-50-4-110). $0.10(OTS).

3925 BMI-89

Battelle Memorial Inst., Columbus, Ohio.

THE PROPERTIES OF THORIUM ALLOYS. Murray C. Udy and Francis W. Boulger. Sept. 15, 1951. Decl. Nov. 30, 1955. 93p. Contract W-7405-eng-92. $0.50(OTS).

A comprehensive treatment covering the pertinent information available on the properties of Th alloys is presented. A table indicates the laboratories studying the alloy systems at the present time. (F.S.)

3926 AEC-tr-2343

THE HOT PRESSING OF LIGHTMETALS IN DIES. W. Brunnckow. Translated by D. E. Cardamone from Anz. Masch. 57, 38-40(1935). 7p.

Parts and fittings shaped from non-ferrous metals by hot-pressing are formed from pieces of extruded semi-fabricated product. The binary transformation of raw materials, first in an extrusion press and secondly in the dies results in much improved mechanical properties. Hot-pressed pieces do not have cavities and pores; they have clean surfaces and close fabrication tolerance measurements. Tables showing the mechanical properties of age-hardened workable Al-base alloys (Al–Cu–Mg, Al–Cu, Al–Cu–Ni, and Al–Mg–Si) are given. Aluminum alloys not age hardened (Al–Mg, Al–Mg–Mn, Al–Si, and Al–mn) have inferior machining properties but high corrosion resistance. The merits and comparisons of 99.5% pure Al and brass 58 and 60 as well as Mg -base alloys (electron) worked in the hot-press treatment are discussed and tabulated. (R.V.J.)

3927 AEC-tr-2437

THE RAPID NON-DESTRUCTIVE DETERMINATION OF SHEET ANISOTROPY WITH THE RESIDUAL POINT POLE METHOD. F. Förster and Gustav Zizelmann. Translated from Z. Metallkunde 45, 245-9(1954). 12p.

A new test apparatus was described for the non-destructive determination of about anisotropy and relative point measurement of the coercive force for a sheet and other extensive bodies. The magnetically preferred location of a sheet is instantaneously determined since the test head simultaneously produces the point magnetization and makes a directional measurement of the residual field strength of the point pole so produced through rotation of the test head. A series of examples shows the technical application range of the method for the sheet and electric industries. (auth)

3928 AEC-tr-2458

THE INHIBITION OF THE COMBUSTION OF Mg AND ITS ALLOYS. Robert Delavault. Translated from Compt. rend. 221, 498-500(1945). 3p.

PHYSICS

3929 KAPL-1502

Knolls Atomic Power Lab., Schenectady, N. Y.

ELECTRICAL CONTACT RESISTANCE BETWEEN SODIUM AND STAINLESS STEEL. L. B. Vandenberg. Feb. 14, 1956. 39p. Contract W-31-109-Eng-52. $0.30 (OTS).

Electrical contact resistance between sodium and stainless steel is investigated experimentally. Results predict the amount of contact resistance that can be expected for varying conditions of temperature, current density, solid surface conditions, and liquid metal purity. It is concluded that for the normal standards of cleanliness now practiced in liquid metal coolant work, electrical contact resistance is in the order of 0.037 micro-ohms/in.^{2} in a 0 to 7000 amp/in.^{2} range. Such resistance can therefore be ignored in the calculation and design of such devices. (auth)

3930 ORO-149

Weather Bureau, Oak Ridge, Tenn. and Oak Ridge Operations Office. Research and Development Div., AEC.

AN ATMOSPHERIC DIFFUSION NOMOGRAM WITH EXTENDED PARAMETER RANGES. Frank Gifford. Feb. 15, 1956. 5p. 1 illus. $0.10(OTS).

3931 AEC-tr-2459

SHOCK WAVES IN A RELAXING MEDIUM. S. P. Dyakov. Translated from Zhur. Eksptl.' i Teoret. Fiz. 27, 728-34(1954). 9p.

A weak shock wave in a relaxing medium, molecular hydrogen, was examined analytically. (F.S.)

GASES

3932 LA-1937

Los Alamos Scientific Lab., N. Mex.

SOME TRANSPORT AND EQUILIBRIUM PROPERTIES OF HYDROGEN AT HIGH TEMPERATURES AND PRESSURES. W. A. Blanpied. July 1955. Decl. Apr. 20, 1956. 13p. Contract W-7405-eng-36. $3.30(ph OTS); $2.40 (OTS).

The coefficients of viscosity and thermal conductivity for molecular hydrogen have been calculated in the temperature range 300 to 3000°K. Specific heat data and the equation of state are given, and the effects of high pressures calculated. (auth)

INSTRUMENTS

3933 KAPL-ADM-1270

Knolls Atomic Power Lab., Schenectady, N. Y.

FINAL REPORT ON THE TESTS AND DEVELOPMENT PROGRAM OF MgO SHEATH-TYPE THERMOCOUPLES.

J. W. Stark. May 20, 1955. 25p. Contract W-31-109-Eng-52. $4.80(ph OTS); $2.70(mf OTS).

The results of tests performed on 1/16- and 1/8-inch magnesium oxide, sheath-type thermocouples are given. The thermocouples were subjected to dye check, x-ray leak check, and sodium and bend tests. In addition, specially selected thermocouples were given special engineering tests such as sodium penetration, x-ray comparison, thermal cycling, calibration, x-ray, dye check, resistance check, leak check, sodium tests, flame tests, cross-sectioning, and corrosion test, and 2100-hour tests were performed. These test results contributed to the development of manufacturing procedures of the Mark B thermocouples. (auth)

3934 AEC-tr-2439

PRECISION MEASURING INSTRUMENTS ON THE BASIS OF FLOW. Lothar Leinert. Translated from Werkstatt u. Betrieb 36, 228-31(1942). 16p.

After a representation of the fundamentals of the pneumatic measuring method, the especially advantageous application during measurements of mass-produced parts with narrow long drillings is discussed. The instrument which is characterized by a solid method of construction reproduces differences in dimension and shape with an accuracy of one thousandth of a millimeter in a manometer column. (auth)

3935 AEC-tr-2443

INFRARED GAS ANALYZER. T. Mishima, T. Shimazu, and K. Mori. Translated from J. Sci. Research Inst. (Tokyo) 27, 423-30(1951). 18p.

The infrared gas analyzer which consists of a simple optical system making possible an analysis without the use of diffusion systems such as prisms or diffraction gratings, does not require a large-scale apparatus and can therefore be handled with comparative ease under the present circumstances. The apparatus is simple and is capable of quickly analyzing the gas within a factory and when used with appropriate recording apparatus it can make a continuous record of the composition of the gas. (auth)

3936 AEC-tr-2449

A NEW KIND OF INSTANTANEOUS LOGARITHMIC WIDE BAND AMPLIFIER. G. Epprecht. Translated from Tech. Mitt. PTT 29, 161-7(1951). 16p.

A logarithmic-reading amplifier containing nonlinear circuit elements has the logarithm input voltage appearing directly at the output. Special cascading controls the overmodulation of the amplifier for large voltage ranges. (F.S.)

3937 AEC-tr-2469

ON A THERMAL ION SOURCE WITH EXTREMELY SMALL MATERIAL CONSUMPTION. H. Hintenberger and C. Lang. Translated from Z. Naturforsch. 11a, 167(1956). 2p.

Designs are given for an improved thermal ion source which consists of a small tube which can be heated either by radiation or electron bombardment by a heating coil along the tube axis. (B.J.H.)

MEASURING INSTRUMENTS AND TECHNIQUES

3938 DP-47

Du Pont de Nemours (E. I.) & Co. Savannah River Lab., Augusta, Ga.

TEMPERATURE COEFFICIENTS OF SCINTILLATION DETECTORS. T. Richard Herold, William A. Kropp, and James S. Stutheit. Mar. 1956. 23p. Contract AT(07-2)-1. $0.20(OTS).

Photomultiplier scintillation detectors used at the Savannah River Plant for continuous radioactivity measurement were found to be sensitive to changes in temperature. This report describes work done to determine and correct the temperature sensitivity of the detectors. (auth)

3939 HW-41007

Hanford Atomic Products Operation, Richland, Wash.

AN AUTOMATIC RECORDING THERMOBALANCE. C. Groot and V. H. Troutner. Jan. 20, 1956. 18p. Contract W-31-109-Eng-52. $3.30(ph OTS); $2.40(mf OTS).

An automatic recording thermobalance, to measure the changes in weight of a substance as it is heated, was developed. (F.S.)

3940 ORNL-2066

Oak Ridge National Lab., Tenn.

THIN-WINDOW MOUNT FOR NaI SCINTILLATION CRYSTALS. C. D. Goodman and J. L. Need. Apr. 19, 1956. 5p. Contract W-7405-eng-26. $0.10(OTS).

Resolutions better than 10% for the Cs^{137} gamma and 5% for 8-Mev alpha were obtained from crystals mounted in the described manner. (D.E.B.)

MESONS

3941 AEC-tr-2418

NUCLEAR INTERACTION OF π^--MESONS IN COPPER. N. M. Kocharyan, G. S. Saakyan, M. T. Aĭvazyan, Z. A. Kirakosyan, and A. S. Aleksanyan. Translated by Rose V. Jermain from Doklady Akad. Nauk S.S.S.R. 105, 1204-7 (1955). 4p.

The π^--meson formation spectrum produced by neutrons in Cu was studied by means of a magnetic spectrometer. Total cross sections for the interaction are tabulated. (B.J.H.)

NUCLEAR PROPERTIES

3942 IDO-16238

Phillips Petroleum Co. Atomic Energy Div., Idaho Falls, Idaho.

SUCCESSIVE NEUTRON CAPTURE IN Ta. R. R. Smith, S. D. Reeder, and R. H. Lewis. Sept. 22, 1955. 13p. Contract AT(10-1)-205. $3.30(ph OTS); $2.40(mf OTS).

Measurements of the Ta^{182} and Ta^{183} activities produced in a high-level neutron irradiation of Ta have been used to evaluate the absorption cross section of Ta^{182}. The gross decay of two samples irradiated for different times in a thermal neutron flux of 1.48×10^{14} neutrons/cm^2 sec were followed over a period of five months with a windowless 4π beta counter. In each case the gross decay was separable into two components; one corresponding to the 111-day Ta^{182} and the other to the 5.1-day Ta^{183}. Assuming 4π geometry for beta detection a comparison of the two activities leads to a value of 15,000 ± 2000 barns for the pile neutron cross section of Ta^{182}. (auth)

NUCLEAR REACTORS

3943 AECD-3712

Chicago Operations Office, AEC.

HISTORY AND STATUS OF THE EBR. Warner E. Unbehaun. Apr. 15, 1953. Decl. with deletions Nov. 14, 1955. 69p. $0.40(OTS).

3944 AECU-3166

Newport News Shipbuilding and Dry Dock Co., Va.

PRELIMINARY ECONOMIC REPORT ON THE APPLICATION OF ATOMIC POWER TO MERCHANT SHIPS. PART I. MIXED DRY CARGO SHIPS. PART II. OIL TANKER

SHIPS. W. J. Burns, Jr. Apr. 1956. (Issued in two parts: AECU-3166(Pt. I), 59p. $0.40(OTS) and AECU-3166(Pt. II), 59p. $0.40(OTS).

Standard equations used in determining merchant ship operating costs are applied using a nuclear power source. These costs are plotted as functions of speed, ship capacity, and time at sea for four types of mixed cargo ships and five type of tankers. Results indicate that nuclear power is presently economically feasible for large, high-speed, long-voyage mixed-cargo and tanker vessels. (D.E.B.)

3945 BNL-178
Brookhaven National Lab., Upton, N. Y.
A SURVEY OF THREE HEAT EXCHANGERS FOR A LIQUID METAL FUEL REACTOR. M. Clark. June 1952. Decl. Nov. 23, 1955. 85p. Contract AT-30-2-Gen-16. (LMFR-7). $0.50(OTS).

A study is made of three heat exchanger systems to be used in conjunction with the liquid fuel reactor. A conventional heat exchanger with many tubes of Croloy 2¼ tubes through which the primary reactor coolant flows countercurrently to the secondary coolant is considered. The second, a tubular heat exchanger, is similar to the first except that any thermal pumping is augmented by a mechanical pump. The third system which was found to have many advantages, is referred to as the spray heat exchanger in which the dense Bi coolant is formed into drops near the top of the exchanger and allowed to fall through and in direct contact with the molten salt of low density. (J.E.D.)

3946 BNL-1987
Brookhaven National Lab., Upton, N. Y.
INTRACELL FLUX TRAVERSES AND THERMAL UTILIZATIONS FOR 1.15% ENRICHED URANIUM RODS IN ORDINARY WATER. Herbert Kouts. Aug. 11, 1954. Decl. Oct. 31, 1955. 38p. Contract AT-30-2-Gen-16. $0.30(OTS).

The measurements reported are those of the spacial distribution of thermal neutrons in typical lattice cells of slightly enriched U rod-ordinary H_2O assemblies. Flux traverses were made both with pure H_2O and boron-poisoned H_2O for the moderator. The detector used were small foils of dysprosium oxide dispersed in lucite or polyethelene. (auth)

3947 CF-55-6-148
Oak Ridge National Lab., Tenn.
CRITICAL TESTS FOR THE PENNSYLVANIA STATE UNIVERSITY REACTOR. E. B. Johnson and K. M. Henry. June 30, 1955. 6p. Contract [W-7405-eng-26]. $1.80 (ph OTS); $1.80(mf OTS).

Critical tests with the fuel elements for the Pennsylvania State University Reactor were performed in the grid of the ORNL Bulk Shielding Reactor. A total of three configurations were assembled, each of which was completely reflected by water. In each loading the proposed positions of the four control rod elements were simulated. (auth)

3948 CF-56-4-191
Oak Ridge National Lab., Tenn.
SOME OBSERVATIONS ON REACTOR CRITICALITY CALCULATIONS. A. S. Householder. Apr. 24, 1956. 13p. Contract [W-7405-eng-26]. $3.30(ph OTS); $2.40 (mf OTS).

Single-group equations for one-dimensional reactor criticality calculations are discussed. (B.J.H.)

3949 ORNL-2007
Oak Ridge National Lab., Tenn.
A COMPARISON OF ONE-DIMENSIONAL CRITICAL MASS COMPUTATIONS WITH EXPERIMENTS FOR COMPLETELY REFLECTED REACTORS. F. G. Prohammer. Mar. 16, 1956. 20p. Contract W-7405-eng-26. $3.30 ph OTS); $2.40(mf OTS).

Critical mass calculations for completely reflected cylindrical reactors would be greatly facilitated if a one-dimensional computational program used for spherical reactors could be applied. A comparison of cylindrical and spherical reactors has shown that the cylindrical reactors can be converted to equivalent spheres by a relationship which assumed that the buckling of a sphere is equal to that of the cylinder making allowance for reflector savings δ. (auth)

3950 ORNL-2018
Oak Ridge National Lab., Tenn.
OPERATING PROCEDURE FOR THE BULK SHIELDING FACILITY. Third Edition. F. C. Maienschein and K. M. Henry. May 2, 1956. 17p. Contract W-7405-Eng-26. $0.20(OTS).

3951 WAPD-CE-39
Westinghouse Electric Corp. Atomic Power Div., Pittsburgh.
APPROXIMATE FORMULAS FOR CALCULATION OF THERMAL STRESS IN REACTOR VESSELS, THERMAL SHILEDS AND THIMBLES. B. F. Langer. Mar. 11, 1955. Changed from OFFICIAL USE ONLY Apr. 13, 1956. 10p. $1.80(ph OTS); $1.80(mf OTS).

Approximate formulas for the calculation of temperature and thermal stress in flat or slightly curved plates which are subjected to internal heat generation are given. Formulas for flat plates are exact and are within 5% for cyclindrical shells whose thickness-to-diameter ratio does not exceed 1/10. (F.S.)

Refer also to abstract 3909.

NUCLEAR TRANSFORMATION

3952 UCRL-3330
California. Univ., Berkeley. Radiation Lab.
THE ABSOLUTE YIELD OF LOW-ENERGY NEUTRONS FROM 190-MEV PROTON BOMBARDMENT OF GOLD, SILVER, NICKEL, ALUMINUM, AND CARBON (thesis). Edward Gross. Feb. 29, 1956. 77p. Contract W-7405-Eng-48. $12.30(ph OTS); $4.50(mf OTS).

The nucleons emitted from high-energy nuclear disintegrations are believed to be the result of a two-stage process: (a) the cascade process followed by (b) the evaporation process. Information concerning the roles of these two processes may be obtained from analyses of the emitted neutron spectra. To this end the differential cross sections for the production of neutrons in the energy interval 0.5 to 12 Mev were measured from C, Al, Ni, Ag, and Au targets at 45°, 90°, and 135° to the 190-Mev proton beam direction. The neutrons were detected by the technique of proton recoils in nuclear emulsions. The internal cyclotron beam was monitored by comparing the activity of foils placed over the target to the activity of foils exposed to the external cyclotron beam. The angular variation of the neutrons emitted from Ag and Au appears to be isotropic in the laboratory. An angular variation begins to appear in the neutrons emitted from Ni and becomes more pronounced in the neutrons emitted from Al

and C. Some of the angular variations are consistent with an isotropic c.m. distribution, but the angular behavior above a neutron energy of 3 Mev cannot be so interpreted. The observed spectra are therefore attributed to two processes: (a) an isotropic evaporation process, and (b) an angle-dependent cascade process. The total cross section consistent with c.m. isotropy is plotted against mass number and compared to similar results from 14-Mev neutron bombardment. The average excitation energy of the evaporating nucleus is plotted against mass number of the target and compared to excitation energies calculated by the Monte Carlo method. (auth)

3953 UCRL-3334
California. Univ., Berkeley. Radiation Lab.
ANGLE AND ENERGY DISTRIBUTIONS OF CHARGED PARTICLES FROM THE HIGH-ENERGY NUCLEAR BOMBARDMENT OF VARIOUS ELEMENTS (thesis). L. Evan Bailey. Mar. 1, 1956. 114p. Contract W-7405-Eng-48. $18.30(ph OTS); $6.00(mf OTS).

PARTICLE ACCELERATORS

3954 ORNL-2023
Oak Ridge National Lab., Tenn.
BIBLIOGRAPHY OF CYCLOTRON LITERATURE. R. S. Livingston, F. T. Howard, and Graham Rudolph. Apr. 18, 1956. 91p. Contract W-7405-eng-26. $0.50(OTS).

The subject area of this bibliography is limited to published material concerning fixed-frequency and frequency-modulated cyclotrons. Articles appearing in scientific journals or in "project" literature during the years 1933 to 1955 are summarized or abstracted. (auth)

RADIATION EFFECTS

3955 KAPL-1493
Massachusetts Inst. of Tech., Cambridge.
X-RAY MEASUREMENT OF ANNEALED SAMPLES OF DAMAGED GRAPHITE. D. R. Chipman and B. E. Warren. Jan. 13, 1956. 19p. For Knolls Atomic Power Lab. Contract W-31-109-Eng-52, Subcontract AT(30-3)-49. $0.20(OTS).

The shapes of the 002 and 004 reflections from graphite were determined, using a sample irradiated to 1480 Mwd/ct, and subsequently annealed sequentially at 695°C and 995°C. The character of the reflections, and the changes therein are related to the nature of the defects in graphite. The x-ray effects can be explained in terms of interstitial defects which cause separations of the layers in graphite. (auth)

RADIOACTIVITY

3956 CF-55-4-104
Oak Ridge National Lab., Tenn.
A NOTE ON THE HALF-LIFE OF FISSION PRODUCTS PRODUCED BY UNIFORM IRRADIATION IN A PILE. W. S. Snyder. [1955]. 5p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80(mf OTS).

The half life subsequent to the period of irradiation of a mixture of fission products from a pile operating at a constant power level were estimated. (F.S.)

SHIELDING

3957 CF-56-3-180
Oak Ridge National Lab., Tenn.
NEUTRON SELF-SHIELDING OF A PURELY ABSORBING CYLINDRICAL ROD. Joel Bengston. Mar. 6, 1956. 6p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80(mf OTS).

Theoretical equations are developed for the neutron self-shielding of a purely absorbing cylindrical rod. (B.J.H.)

3958 TID-256
Atomic Energy Commission, Washington, D. C.
A REVIEW OF ANALYTICAL METHODS FOR THE CALCULATION OF NEUTRON AND GAMMA-RAY ATTENUATIONS. T. A. Welton. Oct. 5, 1949. Decl. Nov. 15, 1955. 106p. $0.55(OTS).

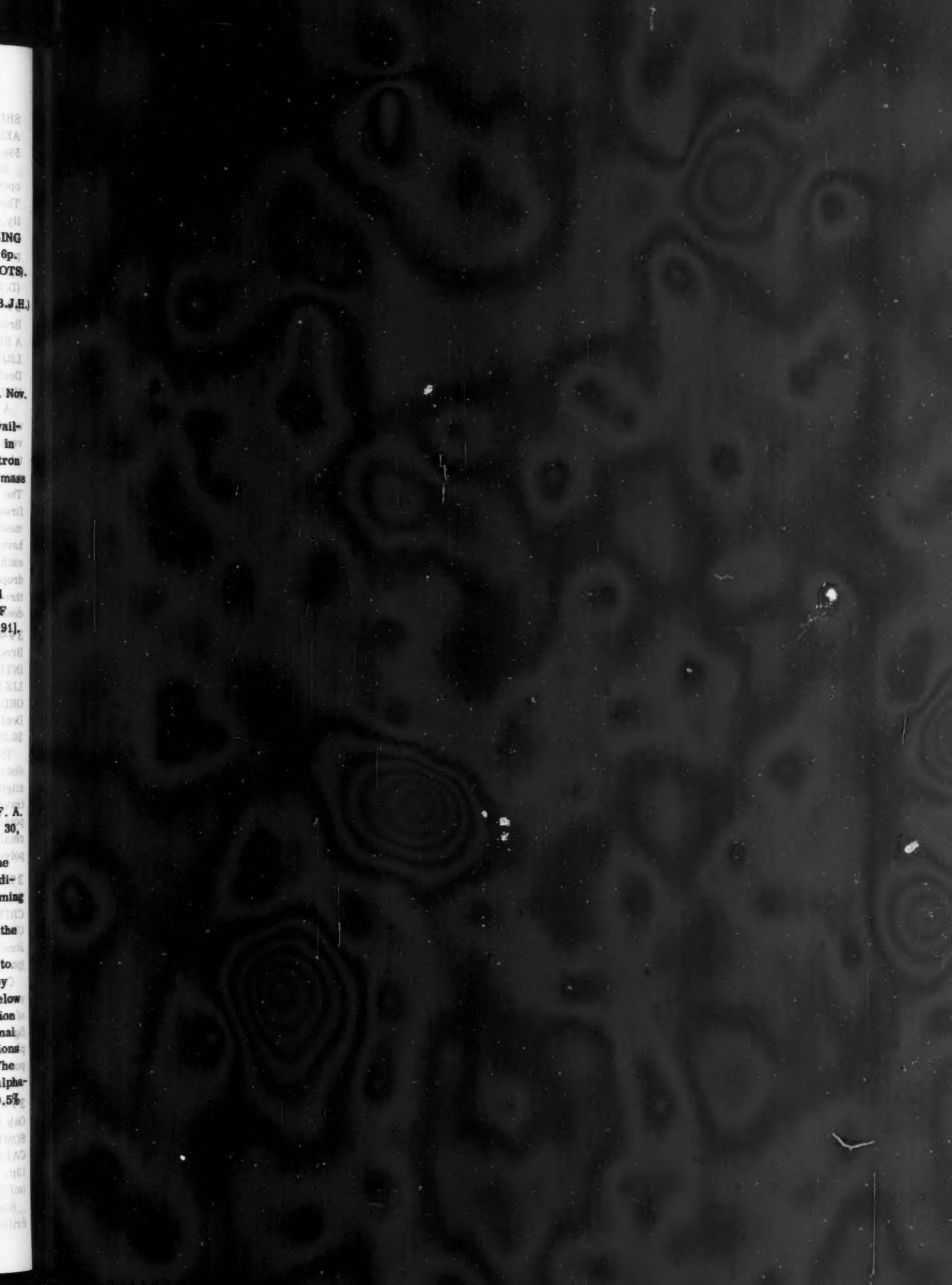
Consideration is given to the theoretical methods available for the solution of an idealized shielding problem in which a point, isotropic, monoenergetic source of neutron or γ radiation is located within a large, homogeneous mass of shield material. (B.J.H.)

SPECTROSCOPY

3959 AECU-3190
Ohio State Univ. Research Foundation, Columbus.
THE X-RAY SPECTROSCOPY OF SOLIDS. Technical Report No. 4. Charles H. Shaw. Jan. 1956. 75p. RF Project 384. Contracts N6onr-22521 and [AT 11-1 -191]. $12.30(ph OTS); $4.50(mf OTS).

A review article, based on a paper read at the 1955 symposium of the ASM held in Philadelphia, on x-ray spectroscopy of solids, is presented. (F.S.)

URANIUM AND URANIUM COMPOUNDS

3960 BMI-72
Battelle Memorial Inst., Columbus, Ohio.
THE CONSTITUTION DIAGRAM OF URANIUM-RICH URANIUM–MOLYBDENUM ALLOYS. H. A. Saller, F. A. Rough, and D. A. Vaughan. June 1, 1951. Decl. Nov. 30, 1955. 32p. Contract W-7405-eng-92.

The Mo–U equilibrium diagram was studied, and the results are presented up to 50 at. % molybdenum. Additions of molybdenum raise the melting point of U, forming a peritectic at about 1285°C. The solubility of Mo in gamma U is extensive. It decreases from 42 at. % at the peritectic temperature to 30% at lower temperatures. Alloys of about 28 to 30% Mo content have been found to contain a metastable gamma. It can be transformed by cold work and prolonged annealing at temperatures below 575 to 600°C. X-ray-diffraction studies of the transition product in epsilon phase indicate that it has a tetragonal structure. The beta-U region is lowered by Mo additions to produce a eutectoid transformation at 658 ± 5°C. The maximum beta solubility is about 1.0 at. % Mo. The alpha-U solubility is less than in the beta region, or about 0.5% Mo at 600°C. (auth)